

What is claimed is:

1. An optical radiation sensor device for detecting radiation in a radiation field, the device comprising:

5 a radiation collector for receiving radiation from a predefined arc around the collector within the field and redirecting the received radiation along a predefined pathway; and

a sensor element capable of detecting and responding to incident radiation along the pathway.

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2. The optical sensor defined in claim 1, wherein the predefined arc comprises a substantially 360° arc.

15 3. The optical sensor defined in claim 1, wherein the predefined arc comprises at least one arc less than 360°.

4. The optical sensor defined in claim 1, wherein the predefined arc comprises two or more independent arcs less than 360°.

20 5. The optical sensor defined in any one of claims 1-3, wherein the radiation collector comprises a distal surface having a generally concave shape and further comprises a reflective surface to reflect the incident radiation along the pathway.

25 6. The optical sensor defined in any one of claims 1-3, wherein the radiation collector comprises a distal surface having a generally convex shape which refracts and reflects the incident radiation along the pathway.

30 7. The optical sensor defined in any one of claims 1-6, wherein the radiation collector is directly mounted to the sensor element.

8. The optical sensor defined in any one of claims 1-6, wherein the radiation collector is remote from the radiation sensor.

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9. The optical sensor defined in any one of claims 1-8, wherein the radiation collector has a polygonal cross-section.

5 10. The optical sensor defined in any one of claims 1-8, wherein the radiation collector has a generally circular cross-section.

10 11. A radiation source module comprising a frame having a first support member; at least one radiation source assembly extending from and in engagement with a first support member, the at least one radiation source assembly comprising at least one radiation source and a radiation sensor device comprising: a radiation collector for receiving radiation from a predefined arc around the collector within the field and redirecting the received radiation along a predefined pathway; and a sensor element capable of detecting and responding
15 to incident radiation along the pathway.

12. The radiation source module defined in claim 11, wherein the predefined arc comprises a substantially 360° arc.

20 13. The radiation source module defined in claim 11, wherein the predefined arc comprises at least one arc less than 360°.

14. The radiation source module defined in claim 11, wherein the predefined arc comprises two or more independent arcs less than 360°.

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15. The radiation source module defined in any one of claims 11-14, wherein the at least one radiation source is disposed within a protective sleeve.

30 16. The radiation source module defined in any one of claims 11-15, wherein the radiation collector comprises a distal surface having a generally concave shape and further comprises a reflective surface to reflect the incident radiation along the pathway.

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- 5 17. The radiation source module defined in any one of claims 11-15, wherein the radiation collector comprises a distal surface having a generally convex shape which refracts and reflects the incident radiation along the pathway.
- 10 18. The radiation source module defined in any one of claims 11-17, wherein the radiation collector is directly mounted to the sensor element.
19. The radiation source module defined in any one of claims 11-17, wherein the radiation collector is remote from the radiation sensor.
20. The radiation source module defined in any one of claims 11-19, wherein the radiation collector has a polygonal cross-section.
- 15 21. The radiation source module defined in any one of claims 11-19, wherein the radiation collector has a generally circular cross-section.
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- 20 22. A radiation source assembly comprising a protective sleeve containing: (i) at least one radiation source, and (ii) a radiation sensor device for detecting radiation in a field, the sensor device comprising: a radiation collector for receiving radiation from a predefined arc around the collector within the field and redirecting the received radiation along a predefined pathway; and a sensor element capable of detecting and responding to incident radiation along the pathway.
- 25 23. The radiation source assembly defined in claim 22, wherein the predefined arc comprises a substantially 360° arc.
- 30 24. The radiation source assembly defined in claim 22, wherein the predefined arc comprises at least one arc less than 360°.

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25. The radiation source assembly defined in claim 22, wherein the predefined arc comprises two or more independent arcs less than 360°.

26. The radiation source assembly defined in any one of claims 22-25, wherein the radiation collector comprises a distal surface having a generally concave shape and further comprises a reflective surface to reflect the incident radiation along the pathway.

27. The radiation source assembly defined in any one of claims 22-25, wherein the radiation collector comprises a distal surface having a generally convex shape which refracts and reflects the incident radiation along the pathway.

28. The radiation source assembly defined in any one of claims 22-27, wherein the radiation collector is directly mounted to the sensor element.

29. The radiation source assembly defined in any one of claims 22-27, wherein the radiation collector is remote from the radiation sensor.

30. The radiation source assembly defined in any one of claims 22-29, wherein the radiation collector has a polygonal cross-section.

31. The radiation source assembly defined in any one of claims 22- 29, wherein the radiation collector has a generally circular cross-section.

32. A fluid treatment system comprising an array of radiation sources for generating a field of radiation, the array of radiation sources further comprising a radiation sensor device for detecting radiation in the field of radiation, the sensor device comprising: a radiation collector for receiving radiation from a predefined arc around the collector within the field of radiation and redirecting the received radiation along a predefined pathway; and a sensor element capable of detecting and responding to incident radiation along the pathway.

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33. The fluid treatment system defined in claim 32, wherein the predefined arc comprises a substantially 360° arc.

34. The fluid treatment system defined in claim 32, wherein the predefined
5 arc comprises at least one arc less than 360°.

35. The fluid treatment system defined in claim 32, wherein the predefined arc comprises two or more independent arcs less than 360°.

10 36. The fluid treatment system defined in any one of claims 32-35, wherein the radiation collector comprises a distal surface having a generally concave shape and further comprises a reflective surface to reflect the incident radiation along the pathway.

15 37. The fluid treatment system defined in any one of claims 32-35, wherein the radiation collector comprises a distal surface having a generally convex shape which refracts and reflects the incident radiation along the pathway.

20 38. The fluid treatment system defined in any one of claims 32-37, wherein the radiation collector is directly mounted to the sensor element.

39. The fluid treatment system defined in any one of claims 32-37, wherein the radiation collector is remote from the radiation sensor.

25 40. The fluid treatment system defined in any one of claims 32-39, wherein the radiation collector has a polygonal cross-section.

41. The fluid treatment system defined in any one of claims 32-39, wherein the radiation collector has a generally circular cross-section.